ALGEBRA

C—5

36. If $\chi^2 + \frac{1}{\chi^2} = 7$, *then what is the* value of $\chi^3 + \frac{1}{\chi^3}$?

(A) 9
(B) 18
(C) 27
(D) 36

SSC CHSL 2023

$x + \frac{1}{x} = \sqrt{7+2}$

$= \sqrt{9} = 3$

$x^3 + \frac{1}{x^3} = (3)^3 - 9$

$=$

37. If $a^2 + \frac{1}{a^2} = 3$, *then* $a^3 + \frac{1}{a^3} = ?$

(A) $3\sqrt{5}$
(B) $2\sqrt{5}$
(C) $2\sqrt{3}$
(D) $3\sqrt{3}$

RRB ALP & TEC 18

$$a + \frac{1}{a} = \sqrt{3+2} = \sqrt{5}$$

$$a^3 + \frac{1}{a^3}$$

$$(\sqrt{5})^3 - 3(\sqrt{5})$$

$$= 5\sqrt{5} - 3\sqrt{5}$$

$$= 2\sqrt{5}$$

38. If $x^4 + x^{-4} = 1154$, then the value of $x + x^{-1}$ is

(A) 12
(B) 6
(C) 8
(D) 5

RRB NTPC 2021

$$x^4 + \frac{1}{x^4} = 1154$$

$$x^2 + \frac{1}{x^2} = \sqrt{1154+2} = \sqrt{1156} = 34$$

$$x + \frac{1}{x} = \sqrt{34+2} = \sqrt{36} = 6$$

$$x^4 + \frac{1}{x^4} \rightarrow x + \frac{1}{x}$$

39. If $k^4 + \frac{1}{k^4} = 194$, then what is the value of $k^3 + \frac{1}{k^3}$?

(A) 42
(B) 52 ✓
(C) 36
(D) 18

SSC CGL 2022

$$k^4 + \frac{1}{k^4} = 194$$

$$k^2 + \frac{1}{k^2} = \sqrt{194+2} = 14$$

$$k + \frac{1}{k} = \sqrt{14+2} = 4$$

$$k^3 + \frac{1}{k^3} = (4)^3 - 3(4) = 64 - 12 = 52$$

40. If $x^2 + \frac{1}{x^2} = 29$, then what is the value of $x - \frac{1}{x}$.

(A) ± 4
(B) $\pm 3\sqrt{3}$
(C) ± 3
(D) $\pm 4\sqrt{3}$

SSC CGL 2023

$$x - \frac{1}{x} = \sqrt{29 - 2}$$

$$= \sqrt{27} = \pm 3\sqrt{3}$$

41. If $x^4 + \frac{1}{x^4} = 727$, $x > 1$ then what is the value of $(x - \frac{1}{x})$?

(A) 6 (B) -6
(C) -5 (D) 5

SSC CGL 2021

$$x^2 + \frac{1}{x^2} = \sqrt{727 + 2}$$
$$= \sqrt{729}$$
$$= 27$$

$$x^2 + \frac{1}{x^2} = 27$$

$$x - \frac{1}{x} = \sqrt{27 - 2}$$
$$= \sqrt{25}$$
$$= 5$$

43. If $x^2y^2 + \frac{1}{x^2y^2} = 83$, then the value of $xy - \frac{1}{xy}$ is:

(A) 10
(B) 81
(C) 85
(D) 9

RRB NTPC 2019

$$\sqrt{83-2}$$

$$= \sqrt{81} = 9$$

44. If $x^{2n} + \frac{1}{x^{2n}} = k$, then find the value of $x^{n} - \frac{1}{x^{n}}$

(A) k+2
(B) k-2
(C) $\sqrt{k-2}$
(D) $\sqrt{k+2}$

RRB JE 2019

45. If $\chi + \frac{1}{\chi} = -14$ and $\chi < -1$, what will be the value of $\chi^2 - \frac{1}{\chi^2}$?

(A) $-112\sqrt{3}$

(B) $112\sqrt{3}$

(C) $-140\sqrt{2}$

(D) $140\sqrt{2}$

SSC CGL 2022

$$x - \frac{1}{x} = \sqrt{(-14)^2 - 4} = \sqrt{192} = \sqrt{64 \times 3} = \pm 8\sqrt{3}$$

$$x^2 - \frac{1}{x^2} = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right) = (-14)(-8\sqrt{3}) = 112\sqrt{3}$$

-4, -3, -2, -1, 0, +1, +2

46. If $\chi - \frac{1}{x} = 11$ and $\chi > 0$, what is the value of $(\chi^2 - \frac{1}{x^2})$?

(A) $-11\sqrt{123}$
(B) $55\sqrt{5}$
(C) $11\sqrt{123}$
(D) $-55\sqrt{5}$

SSC CHSL 2022

$x + \frac{1}{x} = \sqrt{(11)^2 + 4}$

$= \sqrt{125}$

$= 5\sqrt{5}$

$\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$

$= 5\sqrt{5} \times 11$

$= 55\sqrt{5}$

47. If $(\chi + \frac{1}{\chi}) = \sqrt{6}$ and $\chi > 1$, what is the value of $\chi^8 - \frac{1}{\chi^8}$?

(A) $120\sqrt{3}$
(B) $128\sqrt{3}$
(C) $112\sqrt{3}$
(D) $108\sqrt{3}$

SSC CGL 2023

$$x^8 - \frac{1}{x^8}$$

$$= \left(x^4 + \frac{1}{x^4}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$= 14 \times 4 \times \sqrt{6} \times \sqrt{2}$$

$$= 56 \times \sqrt{2} \times \sqrt{3} \times \sqrt{2}$$

$$= 56 \times 2 \times \sqrt{3}$$

$$= 112\sqrt{3}$$

$$x - \frac{1}{x} = \sqrt{(\sqrt{6})^2 - 4}$$

$$= \sqrt{2}$$

$$x^2 - \frac{1}{x^2} = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$x^4 - \frac{1}{x^4} = \left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$x^8 - \frac{1}{x^8} = \left(x^4 + \frac{1}{x^4}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$x^{16} - \frac{1}{x^{16}} = \left(x^8 + \frac{1}{x^8}\right)\left(x^4 + \frac{1}{x^4}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

48. If $\left(\chi - \frac{1}{\chi}\right) = \sqrt{6}$ and $\chi > 1$ what IS the value of $\left(\chi^8 - \frac{1}{\chi^8}\right)$?

(A) $1024\sqrt{15}$
(B) $992\sqrt{15}$
(C) $998\sqrt{15}$
(D) $1012\sqrt{15}$

SSC CGL 2023

$$x + \frac{1}{x} = \sqrt{(\sqrt{6})^2 + 4} = \sqrt{10}$$

$$\left(x^4 + \frac{1}{x^4}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$= 62 \times 8 \times \sqrt{10} \times \sqrt{6}$$

$$= 496 \times \sqrt{2} \times \sqrt{5} \times \sqrt{2} \times \sqrt{3}$$

$$= 496 \times 2 \times \sqrt{15}$$

$$= 992\sqrt{15}$$